

# **EXHIBIT 2**

**GEODYNAMICS, INCORPORATED VS. DYNAENERGETICS US., INC., ET AL.**  
**Outside Counsel Only Dr. Gary Wooley on 07/18/2018**

1                   IN THE UNITED STATES DISTRICT COURT  
2                   FOR THE EASTERN DISTRICT OF TEXAS  
3                   MARSHALL DIVISION  
4  
5           GEODYNAMICS, INCORPORATED,       \*  
6                   Plaintiff,                   \*  
7                   \*  
8           VS.                               \*   Civil Action No.  
9   \*   2:17-cv-00371-RSP  
10    \*  
11           DYNAENERGETICS US., INC.,       \*  
12                   et al.,                   \*  
13                   Defendants.               \*  
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15           \*\*\*\*\*  
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17                   ORAL AND VIDEOTAPED DEPOSITION OF  
18                   DR. GARY WOOLEY  
19                   JULY 18, 2018  
20  
21                   HIGHLY CONFIDENTIAL  
22                   OUTSIDE COUNSEL ONLY  
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27                   DEPOSITION of DR. GARY WOOLEY,  
28           produced as a witness at the instance of the  
29           Defendants, and duly sworn, was taken in the  
30           above-styled and numbered cause on the 18th day of  
31           July, 2018, from 10:02 a.m. to 5:29 p.m., before  
32           Christy R. Sievert, CSR, RPR, in and for the State  
33           of Texas, reported by machine shorthand, at the  
34           offices of McKool Smith, 300 Crescent Court, Suite  
35           1500, Dallas, Texas 75201, pursuant to the Federal  
36           Rules of Civil Procedure and the provisions stated  
37           on the record or attached hereto.  
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| <p>1 A. Yes.</p> <p>2 Q. And HMX?</p> <p>3 A. Uh-huh (affirmative response). I'm aware</p> <p>4 they -- they exist. Don't know a lot about them.</p> <p>5 Q. Do you know whether those are classified as</p> <p>6 military-grade explosives?</p> <p>7 A. By whom? I mean, it's not a standard.</p> <p>8 It's just a common terminology that's used.</p> <p>9 Q. Sure. Well, based on it the way you use it</p> <p>10 here in Paragraph 14, you say that Connex charges</p> <p>11 use military-grade explosives, and I'm trying to</p> <p>12 understand if those explosives are different than</p> <p>13 explosives used in conventional charges.</p> <p>14 A. Yes, I would -- I would expect that --</p> <p>15 that's part of this description.</p> <p>16 Q. So this -- the description of the use of</p> <p>17 military-grade explosives, again, came from some</p> <p>18 GEO-provided materials?</p> <p>19 A. Yes.</p> <p>20 Q. Okay.</p> <p>21 A. Well, and confirmed through conversation,</p> <p>22 but yes. The answer to that is "yes."</p> <p>23 Q. And then similarly with the last sentence,</p> <p>24 you state that "GEO worked tirelessly to build a</p> <p>25 market for reactive liner perforating charges in</p> | <p>1 A. Yes.</p> <p>2 Q. And in particular, Mr. Price testified that</p> <p>3 that was done in conjunction with the military</p> <p>4 section of the Dynamit Nobel business?</p> <p>5 A. That's my understanding.</p> <p>6 Q. And you point to a master's thesis, the</p> <p>7 Vebis thesis. Have you reviewed that document?</p> <p>8 A. Yes, I think I've seen it. I saw. . .</p> <p>9 Q. And you note in Paragraph 16 -- you state</p> <p>10 that you were unable to find a single document which</p> <p>11 shows that Dyna considered, tested, or manufactured</p> <p>12 a shaped charge containing both nickel and aluminum</p> <p>13 until 2007. Did you see that?</p> <p>14 A. Yes.</p> <p>15 Q. How did you search for documents?</p> <p>16 A. Well, I asked. I looked at some of the</p> <p>17 documents that I did see, and we had this</p> <p>18 conversation about timing. Asked is there anything</p> <p>19 else that goes back that far. I think I asked John</p> <p>20 Hardesty and the lawyers. And based on those</p> <p>21 conversations and what I did see, I was able to make</p> <p>22 this statement.</p> <p>23 Q. I just wanted to make sure that when you</p> <p>24 say you were unable to find, you weren't given carte</p> <p>25 blanche to the whole discovery -- all the documents</p> |
| Page 55  | Page 57  |
| <p>1 both U.S. and global markets."</p> <p>2 Again, that's not based on your</p> <p>3 independent technical expertise and understanding,</p> <p>4 that's based on what GEO told you?</p> <p>5 A. Yeah. It's not because I was there</p> <p>6 watching them until they were tireless. It was</p> <p>7 their words, and I -- you know, after some</p> <p>8 conversation, I said, "I'll just use your words."</p> <p>9 Q. And you've been -- again, you've been in</p> <p>10 the industry for a long time. You have seen</p> <p>11 companies work to market new products, I assume?</p> <p>12 A. Yes.</p> <p>13 Q. And you understand that that doesn't confer</p> <p>14 patentability on that new product every time? You</p> <p>15 understand that?</p> <p>16 A. Yes.</p> <p>17 Q. In Paragraph 15, you turn to describing</p> <p>18 DynaEnergetics' development of reactive shaped</p> <p>19 charges; is that correct?</p> <p>20 A. Yes.</p> <p>21 Q. It looks like in here, you -- you note that</p> <p>22 both Mr. McNelis and Mr. Price testified that</p> <p>23 DynaEnergetics were -- began developing the</p> <p>24 reactive -- a reactive shaped charge in the early</p> <p>25 2000s. Do you see that?</p>                | <p>1 produced in discovery and you ran searches on your</p> <p>2 own.</p> <p>3 A. That's correct, I did not do that.</p> <p>4 Q. Okay. Were you aware that Malte Veehmayer,</p> <p>5 a former R&amp;D manager at Dyna, was deposed in this</p> <p>6 case?</p> <p>7 A. Yes, I believe that's -- I did -- I did</p> <p>8 know that.</p> <p>9 Q. And did -- have you reviewed his deposition</p> <p>10 transcript?</p> <p>11 A. I had conversations about the testimony,</p> <p>12 but I -- as I recall, it was fairly recent.</p> <p>13 Q. Yes.</p> <p>14 A. And I don't think I've seen the transcript,</p> <p>15 except -- with the exception of some excerpts.</p> <p>16 Q. Okay. So it's fair to say that you</p> <p>17 didn't -- and, again, I understand timing is an</p> <p>18 issue. But in -- for these paragraphs, you did not</p> <p>19 have the benefit of reviewing Malte Veehmayer's</p> <p>20 deposition transcript. Is that fair?</p> <p>21 A. The entire transcript, that's correct, yes.</p> <p>22 Q. And at least it's not referenced in here in</p> <p>23 any way?</p> <p>24 A. Correct.</p> <p>25 Q. Do you recall being shown a document, a</p>  |

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| <p style="text-align: right;"><b>Page 94</b></p> <p>1 identified?</p> <p>2 A. Testimony by DynaEnergetics.</p> <p>3 Q. Okay.</p> <p>4 A. I read that testimony, have opinions about</p> <p>5 what they said, and those are described here in</p> <p>6 these paragraphs. And I take that to not be</p> <p>7 comments or input from GEODynamics. Now, of course,</p> <p>8 I got the deposition from the lawyers for</p> <p>9 GEODynamics, but it's --</p> <p>10 Q. Sure.</p> <p>11 A. -- it's testimony by DynaEnergetics. And</p> <p>12 based on what they said and my understanding of the</p> <p>13 technology, I have comments in here about that.</p> <p>14 Q. So Paragraph 14, which of those statements</p> <p>15 do you believe is -- was formed on the basis solely</p> <p>16 of your independent technical expertise?</p> <p>17 A. Okay. We've talked about the fact that</p> <p>18 much of this description of -- of GEO is based on</p> <p>19 their own words, after I've had some conversation</p> <p>20 with them. But the parts that I was already aware</p> <p>21 of is, they were a global player. I knew they were</p> <p>22 global, and they dealt with downhole completions,</p> <p>23 and that they were based in Millsap, Texas.</p> <p>24 Q. Okay.</p> <p>25 A. Now, some of the other descriptions -- and</p>  | <p style="text-align: right;"><b>Page 96</b></p> <p>1 Q. Moving on. Anything else in Paragraph 14?</p> <p>2 A. Yes. I knew they were in the market. I</p> <p>3 took their own description to say that they were a</p> <p>4 market leader. I knew they were involved in</p> <p>5 explosive charges. And -- and, you know, their</p> <p>6 description of being a pioneer in the development</p> <p>7 was their words, but the fact that they were working</p> <p>8 on reactive liners, I found out about. So that's</p> <p>9 the independent part of that, if you will.</p> <p>10 Same thing in 15, I talk a bit about my</p> <p>11 understanding that -- of Dyna's position based on</p> <p>12 Dyna's testimony.</p> <p>13 Q. And is that an opinion that -- again,</p> <p>14 that's an understanding you developed from reading</p> <p>15 deposition testimony in this case, it's not an</p> <p>16 opinion that you formed based on your independent</p> <p>17 technical expertise?</p> <p>18 A. Not independent of the testimony. My</p> <p>19 opinion based on the testimony and what I understood</p> <p>20 it to mean.</p> <p>21 Q. And specifically, you recount what the Dyna</p> <p>22 witnesses testify, don't you?</p> <p>23 A. Correct, I do.</p> <p>24 Q. Okay.</p> <p>25 A. 16 refers to the master's thesis that I</p>  |
| <p style="text-align: right;"><b>Page 95</b></p> <p>1 they deal with wireline-conveyed solutions. Some of</p> <p>2 the other descriptions of that, I've already</p> <p>3 commented on, was some of their own words.</p> <p>4 The fact that GEO sells conventional oil</p> <p>5 well completions was something I was aware of.</p> <p>6 Q. And just to ask you -- stop you, Dr. Wooley,</p> <p>7 did that require your independent technical</p> <p>8 expertise to form those -- that statement, to</p> <p>9 recount that fact?</p> <p>10 A. I don't understand that question. Did it</p> <p>11 require it? It was knowledge that I had already</p> <p>12 before GEO told me, which is what I understood your</p> <p>13 question to be about: What did -- what's in here</p> <p>14 that was not told to me by GEO?</p> <p>15 Q. Is there an opinion that you have formed on</p> <p>16 the basis -- from your independent technical</p> <p>17 expertise that's reflected in that statement?</p> <p>18 MR. FOUNTAIN: Objection to form.</p> <p>19 A. I don't know if you'd call it an opinion.</p> <p>20 It's knowledge. I knew that they were in the</p> <p>21 business, and I knew they provided services. And</p> <p>22 some of the descriptions are their words, but the</p> <p>23 fact that they were in the business was independent</p> <p>24 knowledge.</p> <p>25 BY MR. HEARD:</p> | <p style="text-align: right;"><b>Page 97</b></p> <p>1 looked through. Again, it's -- I -- I got it</p> <p>2 through the lawyers, but it's not written by GEO</p> <p>3 people, it's a master's thesis that Dyna referred</p> <p>4 to.</p> <p>5 And then we've already talked about the</p> <p>6 last sentence in 16, where I was unable to find a</p> <p>7 document that shows Dyna considered, tested, or</p> <p>8 manufactured a shaped charge containing both nickel</p> <p>9 and aluminum until 2007. I looked at some</p> <p>10 documents, I saw the date, I asked if there was</p> <p>11 anything else. I didn't do an independent search of</p> <p>12 everything that's been produced.</p> <p>13 17 refers to some more testimony by Dyna.</p> <p>14 Specifically, on page 9, the testimony is quoted,</p> <p>15 where there's a specific question asked about when</p> <p>16 was the first time DynaEnergetics had considered</p> <p>17 using both nickel and aluminum in a reactive shaped</p> <p>18 charge liner, was it in 2007? And the answer was</p> <p>19 is, "Right. That may be correct, yes."</p> <p>20 Q. So you're just referring to deposition</p> <p>21 excerpts here?</p> <p>22 A. Again, it's the same thing. This is not</p> <p>23 something GEO said, this is something Dyna said.</p> <p>24 Q. But you're not offering -- nothing in what</p> <p>25 you've just described is -- is expressing an opinion</p> |

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| <p style="text-align: right;"><b>Page 98</b></p> <p>1 that you formed based on your expertise; is that</p> <p>2 fair?</p> <p>3 A. Well, it's not my testimony. It's Dyna's</p> <p>4 testimony. I'm not sure what you're asking there.</p> <p>5 Q. There's no -- is there an opinion that you</p> <p>6 can point to that is formed as a basis -- on the</p> <p>7 basis of these statements?</p> <p>8 A. Well, my opinion is, he was telling the</p> <p>9 truth; and therefore, 2007 was the first time that</p> <p>10 Dyna used it.</p> <p>11 Q. And so your opinion is, generally, the</p> <p>12 witnesses are telling the truth when they're</p> <p>13 deposed?</p> <p>14 MR. FOUNTAIN: Objection to form.</p> <p>15 A. Generally, yes.</p> <p>16 BY MR. HEARD:</p> <p>17 Q. Okay. And we already covered the fact that</p> <p>18 you didn't consider the testimony of the -- the</p> <p>19 witnesses that -- Mr. Veehmayer, that testified to</p> <p>20 the work on the reactive liners in 2007; is that</p> <p>21 right?</p> <p>22 MR. FOUNTAIN: Objection to form.</p> <p>23 A. I think that's the testimony you asked if I</p> <p>24 had seen, and I told you I had not.</p> <p>25 BY MR. HEARD:</p> | <p style="text-align: right;"><b>Page 100</b></p> <p>1 that it was aware of the '394 patent as of</p> <p>2 August 17th, 2014; is that right?</p> <p>3 A. Well, the first statement is, "Dyna's been</p> <p>4 aware of the '394 patent since at least August 17,</p> <p>5 2014."</p> <p>6 Q. Correct. And that understanding came from</p> <p>7 DynaEnergetics' interrogatory response; is that</p> <p>8 right?</p> <p>9 A. Right. Yes. I'm sorry, I --</p> <p>10 Q. Sure.</p> <p>11 A. -- may not have answered your question the</p> <p>12 way you wanted me to.</p> <p>13 Q. No, so then you go on in the next sentence</p> <p>14 to state that, "Dyna has likely been aware of the</p> <p>15 '394 patent since much earlier than 2014." Do you</p> <p>16 see that?</p> <p>17 A. Yes.</p> <p>18 Q. So you disbelieve the DynaEnergetics'</p> <p>19 interrogatory response?</p> <p>20 MR. FOUNTAIN: Objection to form.</p> <p>21 A. No. No, I didn't contradict it. It just</p> <p>22 says in addition to what they said in 2014, there's</p> <p>23 additional evidence.</p> <p>24 BY MR. HEARD:</p> <p>25 Q. And, specifically, you point -- you point</p>      |
| <p style="text-align: right;"><b>Page 99</b></p> <p>1 Q. Okay. Let's move on. Let's skip over to</p> <p>2 Paragraph 20.</p> <p>3 MR. HEARD: Let's go ahead and break</p> <p>4 for lunch now.</p> <p>5 THE VIDEOGRAPHER: Off the record,</p> <p>6 12:16.</p> <p>7 (Break taken, 12:16 p.m. to 12:58 p.m.)</p> <p>8 THE VIDEOGRAPHER: We're on the</p> <p>9 record. The time is 12:58.</p> <p>10 BY MR. HEARD:</p> <p>11 Q. Dr. Wooley, I'd ask you to turn in your</p> <p>12 report, Exhibit 1, sitting in front of you, to</p> <p>13 Paragraph 105 on page 60. Have you found it?</p> <p>14 A. Yes.</p> <p>15 Q. And this section is in a -- or this</p> <p>16 paragraph in is three-paragraph section titled,</p> <p>17 "Dyna Has No Reasonable Belief of Noninfringement";</p> <p>18 is that correct?</p> <p>19 A. Yes.</p> <p>20 Q. And in this first paragraph, you discuss</p> <p>21 Dyna's awareness of the '394 patent; is that</p> <p>22 correct?</p> <p>23 A. I do.</p> <p>24 Q. And you note specifically in a sworn</p> <p>25 interrogatory response, DynaEnergetics represented</p>   | <p style="text-align: right;"><b>Page 101</b></p> <p>1 to an e-mail dated April 16th, 2009; is that right?</p> <p>2 A. Yes.</p> <p>3 Q. And, Dr. Wooley, you're -- you're familiar</p> <p>4 with patent law, aren't you?</p> <p>5 MR. FOUNTAIN: Objection to form.</p> <p>6 BY MR. HEARD:</p> <p>7 Q. Generally speaking, you understand when a</p> <p>8 patent issues, that that's -- that a patent is not a</p> <p>9 patent until the date it issues?</p> <p>10 A. Generally, I understand a patent is not a</p> <p>11 patent until it's issued, yes.</p> <p>12 Q. Do you know the issuance date of the '394</p> <p>13 patent?</p> <p>14 A. I don't have it memorized, no.</p> <p>15 Q. Do you understand that it's July 17th,</p> <p>16 2012?</p> <p>17 A. I recall 2012. I don't remember the date.</p> <p>18 Q. So as of an e-mail April 16th, 2009, there</p> <p>19 could be no awareness of GEODynamics' patent, could</p> <p>20 there?</p> <p>21 MR. FOUNTAIN: Objection to form.</p> <p>22 A. Yeah, I think you're reading into that</p> <p>23 sentence something that's not in there. What's your</p> <p>24 question again?</p> <p>25 BY MR. HEARD:</p> |

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| <p style="text-align: right;"><b>Page 134</b></p> <p>1 BY MR. HEARD:</p> <p>2 Q. So specifically, you -- you didn't believe</p> <p>3 that it was a -- for instance, a standardized API</p> <p>4 19B test that he was performing?</p> <p>5 A. I don't think it was ever intended to be.</p> <p>6 Q. Right. And you don't believe it was</p> <p>7 intended to be a -- the following of any standard</p> <p>8 procedure that has been accepted by the industry?</p> <p>9 A. I don't think there was ever an intent to</p> <p>10 do that. The purpose was to try to obtain the</p> <p>11 products of the reaction.</p> <p>12 Q. Was it also an objective of the test to</p> <p>13 simulate the energy that a reactive liner is exposed</p> <p>14 to downhole?</p> <p>15 A. No. It was clearly never intended to be a</p> <p>16 downhole simulation. These are controlled</p> <p>17 laboratory conditions to try to obtain -- to try to</p> <p>18 create the reaction and obtain the product.</p> <p>19 Q. So it also wasn't -- it wasn't intended to</p> <p>20 impart the same amount of energy that would be</p> <p>21 experienced downhole either?</p> <p>22 A. No need to do that.</p> <p>23 Q. Okay.</p> <p>24 A. That's the purpose of laboratory</p> <p>25 experiments, to be able to control the environment</p>  | <p style="text-align: right;"><b>Page 136</b></p> <p>1 that right?</p> <p>2 A. Yes. Well, I observed that he had. I</p> <p>3 mean, the intent was to just create the reaction so</p> <p>4 that we could obtain the product for analysis.</p> <p>5 Q. But you relied on Mr. Hardesty to design</p> <p>6 and actually carry out those tests; is that right?</p> <p>7 A. Yes. I -- I observed and discussed them</p> <p>8 with him. But he has extensive experience at</p> <p>9 running these kinds of tests. And so he proposed</p> <p>10 them, we discussed them, I observed them, and</p> <p>11 observed the test itself, and saw the products.</p> <p>12 Q. Did you -- is it fair to say you deferred</p> <p>13 to him to determine what would, in a suitable</p> <p>14 manner, detonate and be -- detonate the charges and</p> <p>15 be able to recover the liner material?</p> <p>16 MR. FOUNTAIN: Objection to form.</p> <p>17 A. I trusted his extensive laboratory</p> <p>18 experience to be able to create the reaction. And</p> <p>19 it turned out to be proper trust. He was able to do</p> <p>20 that.</p> <p>21 BY MR. HEARD:</p> <p>22 Q. And likewise, did you rely on Dr. DeLeon's</p> <p>23 experience running x-ray diffraction to run those</p> <p>24 tests and generate the data?</p> <p>25 A. Yes. She has extensive experience running</p> |
| <p style="text-align: right;"><b>Page 135</b></p> <p>1 and get what you want.</p> <p>2 Q. Do you know if the test that he performed</p> <p>3 was one that was known to produce nickel aluminide</p> <p>4 reactions under high pressures?</p> <p>5 MR. FOUNTAIN: Objection to form.</p> <p>6 A. Well, the intent was to create an -- a</p> <p>7 reaction with an impact that would give us the</p> <p>8 product of the exothermic reaction for a number of</p> <p>9 different materials.</p> <p>10 BY MR. HEARD:</p> <p>11 Q. And then your understanding is, the</p> <p>12 samples -- or at least some of the samples were sent</p> <p>13 to Dr. DeLeon for x-ray diffraction analysis?</p> <p>14 A. That's my understanding, yes.</p> <p>15 Q. And you didn't -- you weren't on site in</p> <p>16 Dr. DeLeon's lab when she performed x-ray</p> <p>17 diffraction analysis?</p> <p>18 A. I was not. We discussed that some. And it</p> <p>19 was my suggestion that, "I don't think I need to be</p> <p>20 there unless you really want me there. I just need</p> <p>21 to see the results." And I left it up to somebody</p> <p>22 else to take care of the chain of custody issue of</p> <p>23 just -- these samples got to her shop.</p> <p>24 Q. So you relied on Mr. Hardesty to design and</p> <p>25 perform the -- the collection tests adequately; is</p> | <p style="text-align: right;"><b>Page 137</b></p> <p>1 those types of analyses and seemed to be perfectly</p> <p>2 capable, and the results bear that out.</p> <p>3 Q. Did -- were you asked to suggest labs to</p> <p>4 perform the x-ray diffraction?</p> <p>5 A. No.</p> <p>6 Q. Did you ever provide recommendations to any</p> <p>7 labs for analytical testing of the accused products?</p> <p>8 A. Did not. I was not asked to and did not.</p> <p>9 Q. If you flip back in your report just a few</p> <p>10 pages to Paragraphs 28 to 33. It's a section</p> <p>11 titled, "The '394 Patent." Do you see that?</p> <p>12 A. Yes, sir.</p> <p>13 Q. And you note that the -- the inventors of</p> <p>14 the '394 patent there in Paragraph 28 are Leslie</p> <p>15 Raymond Bates and Brian Bourne. Do you see that?</p> <p>16 A. Yes.</p> <p>17 Q. Have you spoken with either of those</p> <p>18 inventors?</p> <p>19 A. Not that I know of. Again, they could have</p> <p>20 been on some of the conference calls. But to my</p> <p>21 knowledge, no.</p> <p>22 Q. Certainly not in connection with this case,</p> <p>23 you haven't spoken with them?</p> <p>24 A. Correct.</p> <p>25 Q. Have you spoken with anyone at QinetiQ</p>  |



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| <p style="text-align: right;"><b>Page 146</b></p> <p>1 A. Yes.</p> <p>2 Q. Okay. And, specifically, you address</p> <p>3 Claims 1, 2, 3, and 28 in the '394 patent; is that</p> <p>4 right? If it helps, in Paragraph 46, that's what</p> <p>5 you stated.</p> <p>6 A. Yes. I'm just flipping through here. I</p> <p>7 believe that's correct.</p> <p>8 Q. And I just want you to confirm that Claim</p> <p>9 20 is not addressed in your report. Is that</p> <p>10 correct?</p> <p>11 A. I believe that's correct. Let me look.</p> <p>12 It's not listed in 46.</p> <p>13 Q. And I'm just -- the reason I'm asking --</p> <p>14 A. Make -- make sure there's not a typo, is</p> <p>15 all I'm doing.</p> <p>16 Q. No, sure, please do. I -- I'm trying to</p> <p>17 clarify that -- in the infringement contentions,</p> <p>18 Claim 20 was listed, and I just want to be --</p> <p>19 confirm, your understanding is that that is no -- at</p> <p>20 this point, it's not being asserted against</p> <p>21 DynaEnergetics.</p> <p>22 A. (Reviews document.)</p> <p>23 Bear with me. I'm flipping through here</p> <p>24 just to confirm.</p> <p>25 Yeah, I believe that's correct.</p> <p style="text-align: right;"><b>Page 147</b></p> <p>1 Q. Okay.</p> <p>2 A. Now, I don't know about the contentions. I</p> <p>3 believe 20 is not addressed in my report.</p> <p>4 Q. Thank you.</p> <p>5 If you'd flip to Paragraph 56, please.</p> <p>6 You're addressing an element of the claim -- of</p> <p>7 Claim 1 referring to a green compacted particulate</p> <p>8 composition. Do you understand that?</p> <p>9 A. Yes, I understand that.</p> <p>10 Q. And as -- when Mr. Hardesty performed his</p> <p>11 collection tests, how did you ensure that the liner</p> <p>12 maintained as a green compacted particulate</p> <p>13 composition?</p> <p>14 MR. FOUNTAIN: Objection to form.</p> <p>15 A. Why would I want to do that?</p> <p>16 BY MR. HEARD:</p> <p>17 Q. Well, then -- that's my question. Did --</p> <p>18 did you not -- you did not confirm whether it</p> <p>19 remained a green compacted particulate composition</p> <p>20 following Mr. Hardesty's preparation?</p> <p>21 A. Well, the test sample was comprised from a</p> <p>22 green compacted particulate composition.</p> <p>23 Q. And then based on the -- the preparation</p> <p>24 that Mr. Hardesty did of the electronic initiator,</p> <p>25 then you understand after that, it was crushed and</p> | <p style="text-align: right;"><b>Page 148</b></p> <p>1 sieved?</p> <p>2 A. Well, yes, the green compacted particulate</p> <p>3 composition was crushed and sieved and then put into</p> <p>4 the test equipment.</p> <p>5 Q. And it wasn't then again -- before being</p> <p>6 put into the test equipment, it wasn't again green</p> <p>7 compacted; is that right?</p> <p>8 A. No. There was no need to.</p> <p>9 Q. Right.</p> <p>10 A. No intent to.</p> <p>11 Q. Did you do anything to empirically verify</p> <p>12 the reliability of Mr. Hardesty's collection tests?</p> <p>13 MR. FOUNTAIN: Objection to form.</p> <p>14 A. I don't know what that means.</p> <p>15 BY MR. HEARD:</p> <p>16 Q. Did you perform any separate testing to</p> <p>17 verify the reliability of the -- the test methods?</p> <p>18 A. There's no need to do that. They would be</p> <p>19 meaningless.</p> <p>20 Q. Do you know if there's an error rate</p> <p>21 associated with Mr. Hardesty's collection tests?</p> <p>22 MR. FOUNTAIN: Objection to form.</p> <p>23 A. There would be no reason to establish an</p> <p>24 error rate with what he was doing. You're applying</p> <p>25 something that doesn't apply here.</p> <p style="text-align: right;"><b>Page 149</b></p> <p>1 BY MR. HEARD:</p> <p>2 Q. So in your mind, the -- the collection</p> <p>3 tests that Mr. Hardesty went through doesn't need to</p> <p>4 be verified that it's a reliable method?</p> <p>5 MR. FOUNTAIN: Objection to form.</p> <p>6 A. Your error analysis is unrelated to what</p> <p>7 was done. I don't -- that question has no meaning</p> <p>8 in these kinds of laboratory tests.</p> <p>9 BY MR. HEARD:</p> <p>10 Q. So you can't -- sitting here today, you</p> <p>11 couldn't develop or consider how to develop a test</p> <p>12 to empirically verify the reliability of the</p> <p>13 collection tests?</p> <p>14 MR. FOUNTAIN: Objection to form.</p> <p>15 A. That would be meaningless. That phrase has</p> <p>16 no meaning in these tests.</p> <p>17 BY MR. HEARD:</p> <p>18 Q. If you would turn in your declaration to</p> <p>19 66, please. Do you see there, you indicate that you</p> <p>20 had spoken with Dr. Arroyave? Do you see that?</p> <p>21 A. Yes, that's correct.</p> <p>22 Q. And, specifically, you were speaking to him</p> <p>23 to gain the understanding that nickel and aluminum</p> <p>24 "in the DPEX shaped charge liner are provided in</p> <p>25 proportions calculated to produce NiAl upon</p> |
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| <p style="text-align: right;"><b>Page 150</b></p> <p>1 detonation of the shaped charge?"</p> <p>2 A. Yes.</p> <p>3 Q. Did you rely on Dr. Arroyave's expertise</p> <p>4 to -- to gain that understanding?</p> <p>5 A. I did rely on Dr. Arroyave's expertise.</p> <p>6 Q. In Paragraph 69, you state that you "have</p> <p>7 spoken with John Hardesty, who analyzed the tunnel</p> <p>8 geometry of the DPEX and HaloFrac charges when fired</p> <p>9 into Berea sandstone cores." Do you see that?</p> <p>10 A. Yes.</p> <p>11 Q. Did you rely on Mr. Hardesty to analyze the</p> <p>12 tunnel geometry to determine whether an exothermic</p> <p>13 reaction had taken place?</p> <p>14 A. Of course.</p> <p>15 Q. Do you know --</p> <p>16 A. There's an implication in your questions</p> <p>17 that I think is off base; and that is, there's</p> <p>18 something wrong with relying on experts that you</p> <p>19 hire.</p> <p>20 Q. That -- you can leave that to us, to the</p> <p>21 lawyers to argue. I'm just asking you questions.</p> <p>22 A. Well, I think the implication of your</p> <p>23 question is there, and I think it's inappropriate.</p> <p>24 MR. HEARD: Move to strike the answer.</p> <p>25 A. Now, you can -- you can certainly discuss</p>   | <p style="text-align: right;"><b>Page 152</b></p> <p>1 formation of NiAl is exothermic in nature; that is,</p> <p>2 that nickel and aluminum interact via an exothermic</p> <p>3 intermetallic reaction to create NiAl." Is that</p> <p>4 right?</p> <p>5 A. Yes, I discussed that with him.</p> <p>6 Q. So you would agree that you gained your</p> <p>7 understanding that -- about the formation of NiAl</p> <p>8 from Dr. Arroyave?</p> <p>9 A. I verified and confirmed some</p> <p>10 understanding, yes, sir.</p> <p>11 Q. So you had a separate understanding before</p> <p>12 speaking with him?</p> <p>13 A. On most of these matters, I did.</p> <p>14 Q. But that's not reflected in Paragraph 70?</p> <p>15 A. I disagree.</p> <p>16 Q. If you could turn to Paragraph 71. And in</p> <p>17 this section, you're dealing with the element</p> <p>18 regarding the electron concentration of 1.5. Do you</p> <p>19 understand that?</p> <p>20 A. That's correct.</p> <p>21 Q. Had you ever heard of Hume-Rothery before</p> <p>22 your involvement in this litigation?</p> <p>23 A. Yes, I had heard of it. I had not known</p> <p>24 about it to the extent that I saw in this</p> <p>25 litigation. I had heard the name.</p> |
| <p style="text-align: right;"><b>Page 151</b></p> <p>1 the legal stuff. I don't want anything to do with</p> <p>2 that. But it's inappropriate to suggest that</p> <p>3 there's anything wrong with relying on another</p> <p>4 expert. I do that often. People with expertise</p> <p>5 like Dr. Arroyave and John Hardesty are people that</p> <p>6 you rely on for expert opinions.</p> <p>7 MR. HEARD: Move to strike the -- the</p> <p>8 nonresponsive response.</p> <p>9 BY MR. HEARD:</p> <p>10 Q. In Paragraph 69 -- did you do anything to</p> <p>11 measure the -- the heat of reaction that took place</p> <p>12 in the samples that were fired?</p> <p>13 A. You're talking about the heat of reaction</p> <p>14 for the -- reaction -- the exothermic reaction?</p> <p>15 Q. Yes.</p> <p>16 A. Yeah, there were no measurements of that.</p> <p>17 We were just looking for product. And never</p> <p>18 intended to, so there's no reason to measure it.</p> <p>19 Q. In Paragraph 70, you discussed the -- that</p> <p>20 you've reviewed a laboratory report from Texray Lab</p> <p>21 Services and have spoken with Dr. Arroyave regarding</p> <p>22 the information in the report. Is that right?</p> <p>23 A. That's correct.</p> <p>24 Q. Okay. And you go on in that paragraph to</p> <p>25 say you "understand from Dr. Arroyave that the</p> | <p style="text-align: right;"><b>Page 153</b></p> <p>1 Q. Had you ever calculated electron</p> <p>2 concentrations before your involvement in this case?</p> <p>3 A. Of course.</p> <p>4 Q. In what context?</p> <p>5 A. Many different times during the course of</p> <p>6 my career, including tutoring my high school</p> <p>7 grandson.</p> <p>8 Q. And is your understanding that electron</p> <p>9 concentration is a ratio of valence electrons to</p> <p>10 atoms?</p> <p>11 A. That's correct.</p> <p>12 Q. But for purposes of developing your</p> <p>13 opinions, you state you've conferred with</p> <p>14 Dr. Arroyave and agree with his analysis; is that</p> <p>15 right?</p> <p>16 A. Yes.</p> <p>17 Q. So did you separately develop an opinion as</p> <p>18 to whether the -- the metals were provided in</p> <p>19 respective proportions calculated to give an</p> <p>20 electron concentration of 1.5, apart from speaking</p> <p>21 with Dr. Arroyave?</p> <p>22 A. I don't know how to separate the two. I</p> <p>23 mean, I consulted with him. I did the calculations</p> <p>24 independently. He -- he did them. We got the same</p> <p>25 result.</p>   |

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|---|---|
| <p style="text-align: right;"><b>Page 166</b></p> <p>1 Dr. Arroyave.</p> <p>2 BY MR. HEARD:</p> <p>3 Q. So it's -- it's really complex? It</p> <p>4 requires some theoretical analysis that someone like</p> <p>5 Dr. Arroyave can speak to?</p> <p>6 MR. FOUNTAIN: Objection to form.</p> <p>7 A. Not to determine whether or not</p> <p>8 infringements occurred, but to answer the kind of</p> <p>9 question you're asking about the degree of</p> <p>10 infringement; that is, if I'm infringing, but I only</p> <p>11 have a little bit, how much do I need to cause a</p> <p>12 sufficient amount of energy to do a good job of</p> <p>13 cleaning out the perforation tunnel? That's where I</p> <p>14 would suggest Dr. Arroyave get involved in the</p> <p>15 calculations. But in terms of infringement, I</p> <p>16 don't -- that's not needed.</p> <p>17 BY MR. HEARD:</p> <p>18 Q. But -- well, then that's not true over the</p> <p>19 entire spectrum. To clarify, if proportions are</p> <p>20 calculated to get Ni<sub>2</sub>Al, but some trace amount of</p> <p>21 NiAl is formed, the only way to figure that out is</p> <p>22 through testing the reactant products and going</p> <p>23 through XRD and SEM and these various analytical</p> <p>24 methods, isn't it?</p> <p>25 MR. FOUNTAIN: Objection to form.</p> | <p style="text-align: right;"><b>Page 168</b></p> <p>1 A. I don't know what you're asking.</p> <p>2 BY MR. HEARD:</p> <p>3 Q. What ratios of nickel and aluminum provided</p> <p>4 in a liner do you believe would not likely to be</p> <p>5 formed in -- formed in NiAl in a liner?</p> <p>6 A. I think you've got it backwards. If nickel</p> <p>7 and aluminum are present, it's very likely that NiAl</p> <p>8 will be formed, which is what's stated here. And --</p> <p>9 and I think you'll find that's Dr. Arroyave's</p> <p>10 opinion also.</p> <p>11 Q. Well, so I -- just going to -- so you can't</p> <p>12 draw a line as to where, looking at a liner</p> <p>13 composition -- well, strike that.</p> <p>14 Stepping back. Do you believe a liner</p> <p>15 that contains 50 percent by weight and 50 percent by</p> <p>16 weight nickel and aluminum would react to form</p> <p>17 nickel aluminide?</p> <p>18 MR. FOUNTAIN: Objection to form.</p> <p>19 A. If nickel and aluminum are present, I</p> <p>20 expect there will be some nickel and aluminum</p> <p>21 formed.</p> <p>22 BY MR. HEARD:</p> <p>23 Q. In any -- any proportions?</p> <p>24 A. That's my expectation, yes. And I think</p> <p>25 that fits with Dr. Arroyave, as I mentioned here in</p> |
| <p style="text-align: right;"><b>Page 167</b></p> <p>1 A. No, I would disagree with that.</p> <p>2 BY MR. HEARD:</p> <p>3 Q. And you state in the final sentence of 109</p> <p>4 that you understand from Dr. Arroyave that NiAl is</p> <p>5 the most likely compound to form of all the nickel</p> <p>6 aluminides; and thus, that NiAl is likely to form in</p> <p>7 nearly any liner containing both Ni and Al powder.</p> <p>8 Do you see that?</p> <p>9 A. Yes. That's very close to what we were</p> <p>10 just talking about.</p> <p>11 Q. Yeah. So do you stand by that and believe</p> <p>12 that?</p> <p>13 A. Yes.</p> <p>14 Q. And you're aware that the -- the Court, in</p> <p>15 its claim construction order, said that -- that the</p> <p>16 patent clearly cannot cover all concentrations of</p> <p>17 nickel and aluminum?</p> <p>18 MR. FOUNTAIN: Objection to form.</p> <p>19 A. I don't think that's what it says. I'll be</p> <p>20 happy to go over the claim construction if you want</p> <p>21 to pull it out. I don't think that's what it says.</p> <p>22 BY MR. HEARD:</p> <p>23 Q. What ratios do you believe would not --</p> <p>24 NiAl would not likely to be formed?</p> <p>25 MR. FOUNTAIN: Objection to form.</p>  | <p style="text-align: right;"><b>Page 169</b></p> <p>1 the report. It was his opinion that's the most</p> <p>2 likely thing to occur.</p> <p>3 Q. And you're not --</p> <p>4 A. Let's use his words, or the words I stuck</p> <p>5 in here.</p> <p>6 Q. You're not concerned that that's contrary</p> <p>7 to the Court's order, are you?</p> <p>8 MR. FOUNTAIN: Objection to form.</p> <p>9 A. Which court order?</p> <p>10 BY MR. HEARD:</p> <p>11 Q. The claim construction order.</p> <p>12 A. I disagree. That's not what it says.</p> <p>13 Q. Okay. So it doesn't concern you if -- that</p> <p>14 that contradicts the Court's claim construction</p> <p>15 order?</p> <p>16 MR. FOUNTAIN: Objection to form.</p> <p>17 A. I don't believe it does. I think your</p> <p>18 question is inaccurate.</p> <p>19 BY MR. HEARD:</p> <p>20 Q. So looking at Claim 1, then, what's the</p> <p>21 purpose of having a requirement for an electron</p> <p>22 concentration of 1.5? Couldn't the claim just read</p> <p>23 "a liner with nickel and aluminum in it"?</p> <p>24 MR. FOUNTAIN: Objection to form.</p> <p>25 A. Well, in -- in one of the claims, it does,</p>   |

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|---|---|
| <p>1 know what the composition of the material is, what</p> <p>2 the liner material is, and you do some -- some --</p> <p>3 some chemical analysis of that, and have the</p> <p>4 evidence of an exothermic reaction in the tunnel</p> <p>5 geometry, then you can get there.</p> <p>6 Q. So looking -- sorry to distract you from</p> <p>7 it, but going back to Column 3, lines 57 to 60, you</p> <p>8 see that the patent states, "By way of example, an</p> <p>9 important feature of the invention is that NiAl</p> <p>10 reacts only when the mixture experiences a shock</p> <p>11 wave of greater than approximately 14 gigapascals.</p> <p>12 This causes the powders to form the intermetallic</p> <p>13 NiAl with a considerable output of energy." Do you</p> <p>14 see that?</p> <p>15 A. Yes.</p> <p>16 Q. Does the patent here describe the use of</p> <p>17 NiAl to produce a considerable output of energy?</p> <p>18 A. As an example.</p> <p>19 Q. Can you identify any portion of the patent</p> <p>20 that describes the use of NiAl to produce a trivial</p> <p>21 amount of energy?</p> <p>22 MR. FOUNTAIN: Objection to form.</p> <p>23 A. I don't think those words are in the</p> <p>24 patent.</p> <p>25 BY MR. HEARD:</p> | <p>1 necessarily be able to make small amounts of NiAl by</p> <p>2 altering the liner blend"?</p> <p>3 A. I think that's fairly obvious. I don't</p> <p>4 know what the question about that is. If you can</p> <p>5 make NiAl, you should be able to modify it slightly</p> <p>6 and have a small amount of NiAl. What's -- I don't</p> <p>7 understand why that's a question.</p> <p>8 Q. How would a person of ordinary skill change</p> <p>9 the proportions of the liner to create small amounts</p> <p>10 of NiAl?</p> <p>11 A. I think it's simply stating the obvious,</p> <p>12 that if you have a process that creates NiAl, take</p> <p>13 that as a given, that you should be able to modify</p> <p>14 it and produce at least small amounts of NiAl.</p> <p>15 Q. Can you articulate how, sitting here today?</p> <p>16 A. With precision in terms of degrees, no.</p> <p>17 But it's fairly clear logic, it seems to me, that if</p> <p>18 you have a process that produces a product, you can</p> <p>19 modify that process slightly and still get some of</p> <p>20 the same product.</p> <p>21 Q. Would a person of skill be able to produce</p> <p>22 small amounts of NiAl by introducing an additional</p> <p>23 metal into the liner?</p> <p>24 A. That's possible.</p> <p>25 Q. How about just by changing the proportions</p> |
| Page 211  | Page 213  |
| <p>1 Q. Can you identify a portion of the patent</p> <p>2 that describes the use of NiAl to produce</p> <p>3 insufficient energy to impact the flow</p> <p>4 characteristics of the perforation tunnel?</p> <p>5 A. I think you're making all that stuff up. I</p> <p>6 don't think those words are in the patent, nor</p> <p>7 they -- should they be.</p> <p>8 Q. Agreed.</p> <p>9 You state in your report that, "If</p> <p>10 one could create a significant amount of NiAl based</p> <p>11 solely on the composition of the liner, one would</p> <p>12 necessarily be able to make small amounts of NiAl by</p> <p>13 altering the liner blend." What's your support for</p> <p>14 that claim?</p> <p>15 A. Where are you reading?</p> <p>16 Q. Paragraph 133.</p> <p>17 A. Of the rebuttal report?</p> <p>18 Q. Yes. And the sentence I read to you is at</p> <p>19 the bottom of that page 54.</p> <p>20 A. Okay. Just a moment, let me get through</p> <p>21 the whole thing here. (Reviews document.)</p> <p>22 Okay. And what is your question?</p> <p>23 Q. What's your basis for the claim that, "If</p> <p>24 one could create significant amounts of NiAl based</p> <p>25 solely on the composition of the liner, one would</p>         | <p>1 of nickel and aluminum in the liner?</p> <p>2 A. Yes, that's possible. All of that</p> <p>3 suggests, as long as you're getting the NiAl, it</p> <p>4 doesn't matter what else you're doing.</p> <p>5 Q. What would a person of ordinary skill need</p> <p>6 to rely on to determine whether adding a metal, such</p> <p>7 as copper, would interfere with the production of</p> <p>8 NiAl?</p> <p>9 A. Probably a look at the chemistry. Look at</p> <p>10 the phase diagram and decide if there's going to be</p> <p>11 anything that would prevent the formation of NiAl.</p> <p>12 But the logic is pretty easy, it's not complicated,</p> <p>13 unless you're going to completely change the</p> <p>14 chemistry somehow.</p> <p>15 Q. Well, and that's the question. Do you know</p> <p>16 how the chemistry could be changed to reduce the</p> <p>17 amount of NiAl you produce?</p> <p>18 A. Given that the fact if NiAl -- if nickel</p> <p>19 and aluminum are involved, if you leave those two</p> <p>20 constituents in there, the most likely thing is,</p> <p>21 they're going to form NiAl. You know, you may be</p> <p>22 able to do some other things at the same time,</p> <p>23 simultaneously. But if those two are involved, the</p> <p>24 most likely thing is, they'll get together and form</p> <p>25 NiAl.</p>        |

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|--|---|
| <p>1 Q. And you gained that understanding from</p> <p>2 Dr. Arroyave?</p> <p>3 A. Yeah, I confirmed it with him. It seemed</p> <p>4 to me that's -- that made sense, but he -- he</p> <p>5 confirmed it and said yeah, the probabilities are</p> <p>6 high that that's the most likely thing to occur.</p> <p>7 Q. How would you quantify the amount of NiAl</p> <p>8 you're getting?</p> <p>9 A. Well, it's just a chemical balance. I</p> <p>10 don't understand what you're asking.</p> <p>11 Q. Is there prior art that supports the --</p> <p>12 what you're stating that supports that you could</p> <p>13 just change the -- easily change to have small</p> <p>14 amounts of NiAl?</p> <p>15 A. I think it's a common sense thing, unless</p> <p>16 you're going to modify the chemistry completely,</p> <p>17 which is a possibility. But based on my</p> <p>18 understanding and Dr. Arroyave's opinion, it's most</p> <p>19 likely that the nickel and aluminum will combine to</p> <p>20 form NiAl.</p> <p>21 Q. But in what quantity, you're not sure?</p> <p>22 A. Well, the quantities formed will depend on</p> <p>23 a lot of different variables.</p> <p>24 Q. And that's what I'm getting at. Do you</p> <p>25 know what variables can be altered to change the</p>   | <p>1 A. Could.</p> <p>2 Q. Have you seen evidence of that?</p> <p>3 A. Where?</p> <p>4 Q. Have you seen evidence of it?</p> <p>5 A. I don't know where you're referring to.</p> <p>6 Q. I'm asking, have you ever seen evidence</p> <p>7 of --</p> <p>8 A. Oh.</p> <p>9 Q. -- a system in which --</p> <p>10 A. Not that I recall. Again, I'd refer you to</p> <p>11 Dr. Arroyave on that. He may have seen a lot more</p> <p>12 evidence of that kind of chemical reaction.</p> <p>13 Q. And if there is that -- if there is a</p> <p>14 reaction between copper and aluminum, would that</p> <p>15 mean that there is some portion of the aluminum</p> <p>16 that's not reacting with the nickel?</p> <p>17 A. Sure, that's possible.</p> <p>18 Q. And can you quantify the extent of that</p> <p>19 interference?</p> <p>20 A. Much more likely that the nickel and</p> <p>21 aluminum will get together than the aluminum and the</p> <p>22 copper.</p> <p>23 Q. And, again, you base that on your</p> <p>24 understanding that you confirmed with Dr. Arroyave?</p> <p>25 A. Yes.</p>  |
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| <p>1 amount of NiAl you're going to get?</p> <p>2 A. Yeah. Change the amount of nickel and the</p> <p>3 amount of aluminum.</p> <p>4 Q. And do you know how that -- those changes</p> <p>5 would affect the -- the resultant amount of NiAl?</p> <p>6 A. If that's all that's in there, it's a</p> <p>7 pretty simple chemical balance. Now, if you start</p> <p>8 changing the chemistry with other materials, then</p> <p>9 you've got to look at it more closely.</p> <p>10 Q. So adding an element -- a third element</p> <p>11 into the equation, like copper, it changes the</p> <p>12 chemistry?</p> <p>13 A. At least some of it, yes. Again, we're</p> <p>14 looking at probabilities of forming, and the high</p> <p>15 probability is, if nickel and aluminum are present,</p> <p>16 they're going to get together and form NiAl. There</p> <p>17 may be some other things that happen, but that's the</p> <p>18 most likely thing that will happen.</p> <p>19 Q. Does copper react with aluminum in a liner</p> <p>20 that contains nickel and aluminum?</p> <p>21 A. Say that again. Let me make sure I get the</p> <p>22 elements straight.</p> <p>23 Q. In a liner that contains nickel and</p> <p>24 aluminum, and then copper is introduced, does copper</p> <p>25 react with the aluminum in that blend?</p> | <p>1 Q. Do the claims of the '394 patent encompass</p> <p>2 liners containing nickel, aluminum, and tungsten,</p> <p>3 where the tungsten is -- accounts for the 70 percent</p> <p>4 of the liner by weight?</p> <p>5 A. And what's your question about that?</p> <p>6 Q. Does the '394 patent cover that ratio?</p> <p>7 Does it cover a liner blend that contains nickel,</p> <p>8 aluminum, and tungsten, where the tungsten is</p> <p>9 70 percent by weight of the liner?</p> <p>10 MR. FOUNTAIN: Objection to form.</p> <p>11 A. Yeah, I don't think those percentages</p> <p>12 matter. If you've got nickel and aluminum together,</p> <p>13 they're likely to form -- if you have nickel and</p> <p>14 aluminum together, they're likely to form NiAl</p> <p>15 intermetallic compound, as a product. There may be</p> <p>16 some other things that go on, but they'll still do</p> <p>17 that.</p> <p>18 BY MR. HEARD:</p> <p>19 Q. So you do -- is your opinion that, yes, the</p> <p>20 '394 patent does encompass liners that have an inert</p> <p>21 metal, like tungsten, up to 70 percent?</p> <p>22 A. Regardless of the fracture.</p> <p>23 Q. Who are the inventors of the '394 patent?</p> <p>24 A. We just went over that a moment ago. You</p> <p>25 asked if I knew them. Leslie Raymond Bates and</p> |